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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/650,424

08/28/2003

Megan A. Fannon

107044-0031

7242

24267 7590 06/12/2008
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EXAMINER

ECHELMEYER, ALIX ELIZABETH

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

06/12/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/650,424	Applicant(s) FANNON ET AL.	
	Examiner Alix Elizabeth Echelmeyer	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4,6-14 and 22-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4,6-14 and 22-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 14, 2008 has been entered.
2. Claims 1, 6, 7, 11 and 14 have been amended. Claims 22-25 have been added. Claims 5 and 15-21 were previously cancelled. Claims 1-4, 6-14 and 22-25 are pending and are rejected for the reasons given below.

Claim Rejections - 35 USC § 112

3. The 112 rejections of December 14, 2007 are withdrawn in light of the amendments.
4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
5. Claims 1-4, 6-13 and 22-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims (specifically, claims 1, 6, 7, 11 and 22) contain newly added limitations to holding "components of the fuel cell"

together without using screws or nuts. It is unclear which components are being held together.

6. Claim 24 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear what is meant by a "fast supply." Does this limitation pertain to the speed at which the fuel is delivered to the diffusion layer? To which it travels through the diffusion layer?

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-4, 7, 10-14, 22, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pflaesterer (US 2003/0235744) in view of Fuglevand et al. (US Patent 6,030,718).

Pflaesterer teaches a sealing arrangement for fuel cells that is created by injection molding a seal to hold the deformable membrane electrode assembly (MEA) between a pair of separator plates (abstract, [0014], [0028]).

Pflaesterer further teaches that the sealing band holds the MEA in compression (abstract), since contact pressure is applied to the assembly during the formation of the seal ([0029]). Since the seal holds the components in compression, additional

mechanical clamps are omitted in this invention ([0044]). The compression of the mold inherently reduces the thickness of the components.

Regarding the newly added limitations concerning the holding together of the fuel cell without using screws and nuts, Pflaesterer teaches that the *cells* are held together by the seals while the *stack* may be held together with endplates and tie bolts. The cells of Pflaesterer are clamped by the seals ([0016]). The instantly claimed invention is drawn to fuel cells, not stacks with the exception of claim 6, which claims an array but the individual cells are held together by the seal. One having ordinary skill in the art at the time the invention was made could easily recognize that the *cells* of Pflaesterer are held together in compression by “clamping” seals while *stacks of the fuel cells* are held together by bolts. Also, the seal of Pflaesterer is a thermoplastic elastomer ([0018]).

Additionally, Pflaesterer teaches that the sealing function is approximately equal in the middle and end regions of the stack ([0013]). Thus, the compression is even across the entire area, as required by the newly amended independent claims of the instant application.

The separators also serve as current collectors and sandwich the MEA ([0006], Figure 1).

As can be seen in Figure 2 of Pflaesterer, a separator (**4**) contains a raised area (adjacent **34**). This raised surface limits the thickness of the gasket (**24**) since the gasket does not extend beyond the raised surface.

Further regarding claim 22, the cells of Pflaesterer contain anodes and cathodes ([0043]).

Regarding claim 4, Pflaesterer teaches injection molding the seal in the frame ([0014]).

With regard to the curing limitation (G) of claim 1, (H) of claim 6, (D) of claim 7, claim 10 and (I) of claim 11, it would be inherent to the invention of Pflaesterer to allow the seal to cure within the mold, since, if the seal was not cured before the mold was removed, it would not properly form.

As for the limitations to the membrane electrode assembly and catalysts, these are taught in Pflaesterer ([0046]), and should be known to one having ordinary skill in the art.

As for claim 24, gas diffusion layers are provided for the electrodes ([0019]). Since the instant specification also teaches gas diffusion layers, one of ordinary skill in the art would recognize that gas diffusion layers can allow a “fast supply” and even distribution of reactants.

Pflaesterer fails to teach leads on the current collectors and the hot pressing step of claim 11.

Fuglevand et al. teach current collector plates having conductive members that extend beyond the outer frame of the plate. These conductive members are received in the outer wall of the fuel cell container for easier conduction of electrical energy generate by the fuel cell. Fuglevand et al. further teach the coating of a diffusion layer on the current collector plate for maintaining electrical contact (Figure 18; column 20 lines 39-67; column 21 lines 1-41). Fuglevand et al. further teach a hot pressing step

prior to sealing the components of the fuel cell (column 17 lines 65-67; column 18 lines 1-6).

It would be advantageous to use the current collectors having leads taught by Fuglevand et al. in the fuel cell of Pflaesterer, as well as the diffusion layer of Fuglevand et al., in order to facilitate the conduction of the electricity produced by the fuel cell.

In this case, the current collector with leads is interpreted to be a lead frame with integrated current collector since the integrated part is a structure designed for giving support to the rest of the components of the fuel cell.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the current collector with leads as taught by Fuglevand et al. as well as the diffusion layer as the current collector of Pflaesterer in order to make the conduction of electricity produced by the stack more efficient.

With regard to claim 25, Pflaesterer et al. fail to teach openings in the current collectors and membrane. The combination of the current collectors of Fuglevand et al. with the cell of Pflaesterer as discussed above teaches openings in the current collector to receive fasteners (Figure 10, column 8 lines 37-41). Since the fastener of Pflaesterer is a seal, and since the seal of Pflaesterer extends to the area where the openings of Fuglevand et al. are, the openings would allow the plastic of the seal of Pflaesterer to flow to form a plurality of internal fasteners.

The membrane of Fuglevand et al. is porous because it supports the electrolyte and provides mechanical strength (column 19 lines 1-5). Since it is porous, it inherently

includes openings. Such openings would allow plastic to flow if the membrane was used in the cell of Pflaesterer.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a porous membrane such as taught by Fuglevand et al. in the cell of Pflaesterer because a porous membrane would support the electrolyte and provide mechanical strength.

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pflaesterer in view of Fuglevand et al. and Draper et al. (US 5,273,838).

The teachings of Pflaesterer and Fuglevand et al. as discussed above are incorporated herein.

Pflaesterer in view of Fuglevand et al. teach a method for forming a fuel cell having a lead frame, with the components sealed in a state of compression (see above).

Pflaesterer in view of Fuglevand fail to teach a fuel cell array.

Draper et al. teach a fuel cell array, wherein each cell in the array is electrically connected by metallic connectors, corresponding to leads of the instant application (abstract).

Draper et al. further teach that having a fuel cell array with the cells connected by leads allows for greater row voltage and for better access of the anodes to fuel flow (column 2 lines 1-6).

It would be advantageous to use the method of Pflaesterer in view of Fuglevand et al. to create an array of fuel cells having lead frames such as taught by Draper et al.,

with the components sealed in a state of compression, since such a fuel cell array would have greater row voltage and good fuel access for the anodes.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made use the method of Pflaesterer in view of Fuglevand et al. to create an array of fuel cells having lead frames such as the array of Draper et al., with the components sealed in a state of compression, since such a fuel cell array would have greater row voltage and good fuel access for the anodes.

10. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pflaesterer in view of Fuglevand et al. as applied to claim 7 above, and further in view of Montminy et al. (US 2004/0211668).

The teachings of Pflaesterer and Fuglevand et al. as discussed above are incorporated herein.

Pflaesterer in view of Fuglevand et al. fails to teach the use of welding to connect components.

Montminy et al. teach the fabrication of a membrane electrode assembly including an anode, polymer electrolyte membrane (PEM), cathode, and flow field plates that can also serve as current collectors integrated by injection molding using a thermoplastic elastomer ([0091]-[0094]). In one embodiment, the material can be injected directly to a space within the flow field plates, but Montminy et al. also teach the use of mold plates as seen in Figure 2.

Montminy et al. also teach the use of welding to connect components ([0096]).

It would be desirable to use welding to connect components of Pflaesterer in view of Fuglevand et al. since it is well known in the art that welding is a sufficient means for connecting components, especially metal components, since it ensures that the components are secured.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use welding to connect components of Pflaesterer in view of Fuglevand et al. since it is well known in the art that welding is a sufficient means for connecting components, especially metal components, since it ensures that the components are secured.

11. Claims 9 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pflaesterer in view of Fuglevand et al. as applied to claim 7 above, and further in view of Roche et al. (US Patent Number 5,097,104).

The teachings of Pflaesterer and Fuglevand et al. as discussed above are incorporated herein.

Pflaesterer in view of Fuglevand et al. fails to teach trimming excess material from the lead frame after forming the membrane electrode assembly.

Roche et al. teach the trimming of excess material from the current collector after the pressing operation to seal the components of the fuel cell. Trimming excess material is necessary in order to remove excess material (column 8 lines 16-38).

It would be desirable to trim excess material from the lead frame of Pflaesterer in view of Fuglevand et al. in order to remove excess material.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to trim excess material from the lead frame in order to remove unneeded material.

Response to Arguments

12. Applicant's arguments filed April 18, 2008 have been fully considered but they are not persuasive.

Applicant argues that end plates and tie bolts hold together the stack or fuel cell of Pflaesterer. However, the teachings of Pflaesterer that are used in the instant invention teach that the seals hold the cells together, see above. While the tie rods may be removed to replace a defective cell, the removal of the tie rods will not allow for the replacement of, say, a defective gas diffusion layer, since the gas diffusion layers are sealed with the individual fuel cells, which are held together by clamping seals. The assertion that Pflaesterer teaches tie rods to hold the cells and therefore does not teach that seals hold the cells together does not appear logical. Cannot the tie rods and the seals hold the cells together? Just because the tie rods are used does not mean that the seals do not also hold the cells together, especially since the references teach that the seals do, in fact, hold the cells together. Additionally, claims 1, 6, 7, 11 and 22 are drawn to methods of fabricating an MEA, fuel cell array, or a seal around a fuel cell or diffusion layer, but not to a method of compressing the fuel cell stack.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is (571)272-1101. The examiner can normally be reached on Mon-Fri 8-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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